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TRENDS IN WISCONSIN'S SPRING DUCK SURVEYS

by Ron Gatti

The inventory of breeding ducks is an annual effort across Canada and the United States. The Wisconsin Department of Natural Resources (DNR) cooperates in this survey by censusing breeding ducks and evaluating wetland habitat on state breeding grounds.

This inventory shows that populations of 2 important duck species - mallard and blue-winged teal - have declined in North America over the past 14 years (1973-86). Both species declined an average of 3%/year during this period of frequent drought in the major duck range.

However, duck surveys closer to home indicate variable trends for mallard and teal. The Minnesota DNR spring duck survey during the same 14 years shows that mallard numbers increased while teal numbers showed no trend. The mallard increase averaged 6%/year during this period of abundant water conditions in Minnesota. Spring duck surveys during the same period at Necedah National Wildlife Refuge (NWR) in Wisconsin show more serious declines of both species (12-14%/year average) than for the whole of North America. Spring duck surveys at Horicon NWR in Wisconsin over the same 14 years show no trend in mallard numbers, but a decline in teal numbers, averaging 9%/year.

The Wisconsin Survey

The Wisconsin spring duck survey began in 1973 and covers 3 regions based on duck density: the southeast-central (SEC), northern high density (NHI), and northern low density (NLO) (Fig. 1). Southwest Wisconsin is not surveyed because of its low density of ducks.

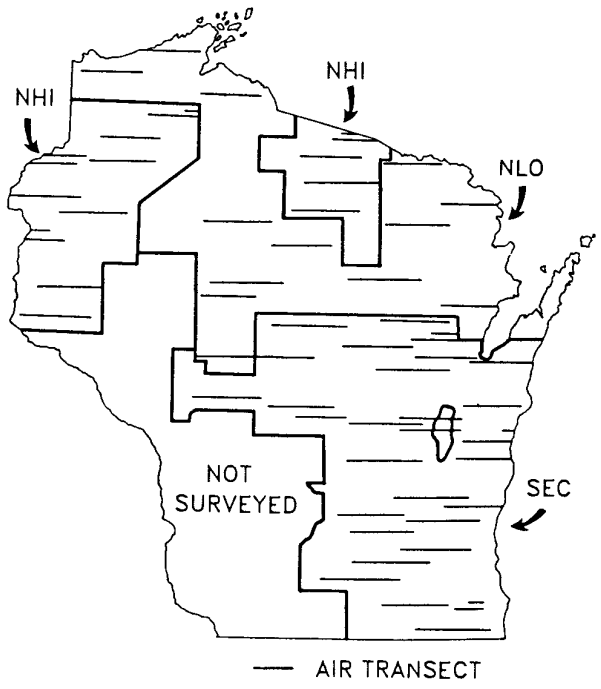

Figure 1. Wisconsin spring duck survey regions (SEC, NHI, NLO) and transects.

We look at 3 components that are involved in estimating duck population trends - air counts, ground counts, and visibility rates. The 3 components may show trends that are masked by the higher variability of the population estimate. Each spring 2 observers in an airplane count ducks on randomly selected, strip transects, each 30 miles long and one-quarter mile wide. The results of the air counts are extrapolated to the total area of each region. Because not all ducks on the transect can be seen from the air, ground crews count ducks on segments of transects in each region to determine the visibility rate from the air. The visibility rate is calculated by dividing the number of ducks seen from the air by the number seen on the ground. The visibility rate is used to extrapolate the air counts into population estimates for each region.

One of the air observers also counts all wetland types to index habitat conditions for the breeding season. The survey starts in southern Wisconsin around May 2 and finishes in northern Wisconsin 12 days later. About half of all ducks seen in the Wisconsin survey are mallard and teal. Not enough ducks of other species are seen to calculate reliable population estimates or trends.

Air Count Trends and Visibility Rates

Air counts provide the largest sample size of the 3 components of the population estimate. However, the accuracy of air counts is more affected by natural phenomenon, such as wetland conditions and tree leafout. Air counts uncorrected for visibility in the SEC region indicate a 14-year population decline for both mallard (average 3%/year) and teal (average 9%/year). Over 200 pairs of each species were counted in the first years of the survey in the SEC, but by 1986 air counts of mallard and teal declined by a third and three-quarters, respectively.

Air counts uncorrected for visibility in the NHI and NLO regions fluctuate, but show no 14-year trends for either species. About 70 mallard and 27 teal pairs are counted each year in the NHI, while only 33 mallard and 12 teal pairs are counted each year in the NLO.

The visibility rate from the air strongly influences the calculation of annual population estimates, yet these rates are highly variable and sometimes are based on extremely small sample sizes. Annual visibility rates for Wisconsin mallard range from 17-100% and average 68%; these rates are higher than those reported in most other areas or past Wisconsin studies. Annual visibility for teal is lower, ranging from 2-71% and averaging 30%. One reason for this is the smaller size of teal. Visibility varies among years depending on wetland conditions, observers, and survey timing, but some of the variability is due to the small sample sizes. The coefficients of variability for annual visibility rates range from 9-142% and average 48% for mallard and teal. Visibility rates in the Wisconsin survey are imprecise, but they may still be an accurate index to yearly population differences. Visibility rates for both species decrease as the survey moves north into more concealing forested habitats.

Visibility rates show a significant 14-year trend only in the NHI region where mallard visibility declined over time. Mallard visibility appears to have declined in the SEC, while teal visibility appears to have increased in both the NHI and NLO.

Ground Count Trends

Although sample sizes are small, ground counts are unaffected by visibility bias. In the SEC region, an average of only 29 mallard and 58 teal pairs are counted on the ground each year. Ground counts in the SEC show no 14-year trend for mallard but indicate a population decline for teal averaging 8%/year.

In the NHI region, an average of only 24 mallard and 31 teal pairs are counted on the ground each year. Ground counts indicate no trend for teal but a population increase averaging 4%/year for mallard in the NHI.

In the NLO region, ground counts show no trend for either species. However, an average of only 15 pairs of each species are counted on the ground each year in the NLO.

Population Estimate Trends

Population estimates incorporate air counts, visibility rates, and ground counts (and their variabilities) to index state duck trends. In the SEC region, population estimates for mallard fluctuate, but show no trend over the 14 years. An average population of about 46,000 mallard is estimated for the SEC each year, a density of 2.5 /mile^2. Population estimates for teal are declining at an average rate of 10%/year (Fig. 2). In the early years of the survey well over 100,000 teal were estimated for the SEC (7.8 /mile^2), but in recent years only 33,000 teal were estimated (1.8 /mile^2).

In the NHI region, mallard population estimates are increasing over time, averaging a 9% increase per year (Fig. 3). An average population of 30,000 mallard is estimated for the NHI, but the density has increased from just over 1/mile^2 in the early years of the survey to 5/mile^2 recently. Teal population estimates show no 14-year trend in the NHI. An average population of 23,000 teal is estimated each year for the NHI, a density of 2.4/mile^2.

In the NLO region, population estimates for mallard and teal show no trend over time. Average populations of 35,000 mallard and 24,000 teal are estimated each year in the NLO (2.2 mallard and 1.5 teal/mile^2.

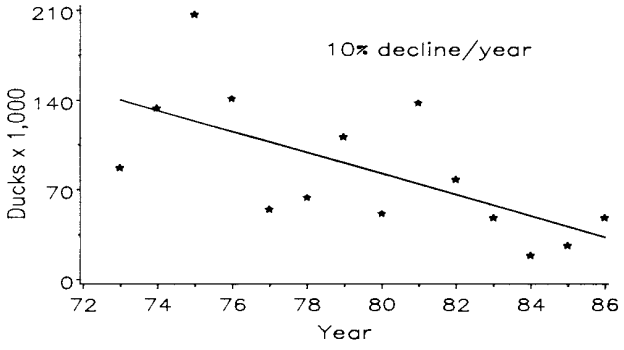

Figure 2. Blue-winged teal population estimates in the SEC region of Wisconsin.

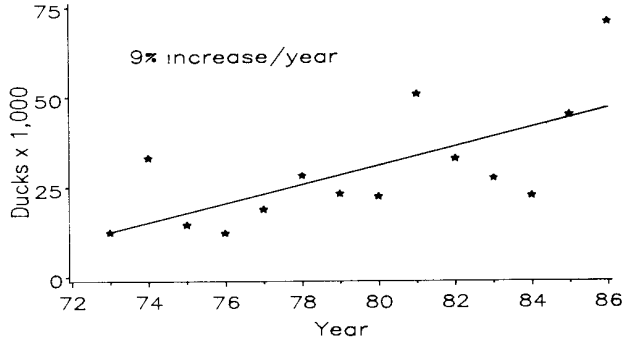

Figure 3. Mallard population estimates in the NHI region of Wisconsin.

In Conclusion

For teal, there are no trends in the 3 components in the 2 northern regions; however, the components indicate a consistent population decline for teal in the southern region. For mallard, there are no consistent trends in the southern or northern low density regions; however, the

components together indicate a population increase for mallard in the northern high density region. These trends should be viewed cautiously. The mallard increase in the northern high density region is not as clear as the teal decrease in the south. There are also problems with our survey. Our visibility rates have been both too high and variable, and teal have been surveyed too early in some years.

The Wisconsin survey was conducted during wet years, when annual precipitation was above normal in 11 of the 14 years of the survey. Ground and surface water level data support this fact. Total wetlands counted during the duck survey also indicate increasing wetlands in the 2 northern regions and stable wetlands in the south. These wet conditions may have temporarily offset the adverse effects of wetland drainage. Drier years will probably alter the increase of mallard in the northern high density region and will worsen the decline of teal in the south.

Given an adequate wetland base, opportunistic mallard appear to be maintaining their populations on the remaining upland habitat in Wisconsin. Duck production data on private lands is needed to confirm this or determine whether "pioneering" mallard from other states and Canada are maintaining our state's mallard population. Teal are less adaptable to upland nesting conditions and in the south are more attracted than mallard to hayfields, where nest success is poor and hen mortality is high. Teal may be declining due to the continual loss of upland habitat, in spite of adequate wetlands. Other explanations are possible, including migrational and wintering differences.

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